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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/082,576	02/25/2002	Junichi Aoyama	09792909-5347	5702
26263	7590	04/22/2004		
SONNENSCHN NATH & ROSENTHAL LLP P.O. BOX 061080 WACKER DRIVE STATION, SEARS TOWER CHICAGO, IL 60606-1080				
			EXAMINER HU, SHOUXIANG	
			ART UNIT 2811	PAPER NUMBER

DATE MAILED: 04/22/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

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<b>Office Action Summary</b>	Application No. 10/082,576	Applicant(s) AOYAMA, JUNICHI	
	Examiner Shouxiang Hu	Art Unit 2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 12 February 2004.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-40 is/are pending in the application.
- 4a) Of the above claim(s) 20-40 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Election/Restrictions*

1. Claims 20-40 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in Paper No. 7.

### *Claim Objections*

2. Claims 1-19 are objected to because of the following informalities and/or defects:

In claims 1 and 10, the term of "without use of a growth guide at the width of the first conductive layer" should read as: -- without use of a growth guide at a direction of the width of the first conductive layer--.

In claim 10 recites twice the term of "a width of said first conductive layer", but fails to clarify the relationship between them.

Appropriate correction is required.

### *Claim Rejections - 35 USC § 112*

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-19 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter

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which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claims 1 and 10 each recite the subject matter that the recited connection pillar is distinct from the recited second conductive layer. However, the original disclosure lacks an adequate description regarding how and to what extent the recited connection pillar is distinct from the recited second conductive layer, especially given the disclosed teachings that the two are preferably formed of a same material (Al; see Paragraphs 0039 and 0049 of the specification).

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-19 are further rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 1 and 10 each recite the subject matters that the connection pillar exhibits characteristics of being formed from a surface of the first conductive layer without use of a growth guide at the width of the first conductive layer. However, the claimed invention fails to definitely define what are the recited characteristics, as the characteristics of the connection pillar are affected by various factors, such as: the quality of the first conductive layer; the forming material, forming method and process conditions for the connection pillar, in addition to the recited factors of being formed "directly on" the first conductive layer in a "self-aligned" manner (e.g., see Paragraphs 0038-0051 of the specification).

***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1, 2, 4-6, 9-11, 13-15, 18 and 19, insofar as being in compliance with 35 U.S.C. 112 and as being best understood in view of the claim objections above, are rejected or further rejected under 35 U.S.C. 102(b) as being anticipated by Toyada et al. ("Toyada"; US 6,215,189; provided along with the previous office action).

Toyada discloses a semiconductor device (Figs. 7-8; also see col. 6, lines 8-12, col. 8, lines 62-67, and col. 9, lines 24), comprising: a second conductive layer (an upper portion of 7a, above the plug portion; Al or Al alloy or Cu); a connection pillar (a lower portion of 7a, the plug portion; Al or Al alloy or Cu); and a first conductive layer (2, Cu) embedded in a groove formed in an insulation film (1), wherein a width (W2) of the connection pillar is aligned along the direction of the width (W1) of the first conductive layer; and, an insulation layer (3 and/or 4) having an opening with a width wider than the width of the first conductive layer and naturally functions as a growth suppression film, as it defines the lateral dimension of the connection pillar therein.

And, it is noted that the recited limitations of "self-aligned" and/or "being grown from a surface of the first conductive layer without use of a growth guide" are regarded as process limitations; however, these would not carry patentable weight in the claims

drawing to a structure, because distinct structure is not necessarily produced. In re Thorpe, 227 USPQ 964, 966 (Fed. Cir. 1985).

***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 3, 7, 8, 12, 16 and 17, insofar as being in compliance with 35 U.S.C. 112, are rejected or further rejected under 35 U.S.C. 103(a) as being unpatentable over Toyoda (US 6,215,189) in view of Kubokoya (JP 8-213391; as provided in the previous office action).

The disclosure of Toyada is discussed as applied to claims 1, 2, 4-6, 9-11, 13-15, 18 and 19 above.

Although Toyada does not expressly disclose that the first conductive layer and the connection pillar can also be both made of Al alloy, one of ordinary skill in the art would readily recognize that Al alloy such as Al-Si is one of the few most commonly used interconnection materials in the art for its good electrical and mechanical properties, as evidenced in Kubokoya (see the first conductive layer 1-3 and the plug 105 in Figs. 1 and 3).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the Al-alloy interconnection material of

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Kubokoya into the device of Toyoda, so that semiconductor device with good interconnections would be obtained. And, regarding claims 7, 8, 16 and 17, the first conductive layer and the connection pillar in Kubokoya are both made of an Al alloy that naturally has a face-centered cubic structure; and thus the first conductive layer and connection pillar in the above collectively taught device would both naturally have a <111> preferred orientation.

### ***Response to Arguments***

9. Applicant's arguments with respect to claims 1-19 have been fully considered but are moot in view of the new ground(s) of rejection; or they are found not persuasive, and the responses to them (including the ones regarding the recited terms of the "distinct from" and "exhibits characteristics" have been fully incorporated into the claims rejections (especially the rejection under 35 U.S.C. 112) and objections set forth above in this Office action.

10. In addition, it is noted again that the recited limitations of "self-aligned" and/or "being grown from a surface of the first conductive layer without use of a growth guide" are regarded as process limitations; however, these would not carry patentable weight in the claims drawing to a structure, because distinct structure is not necessarily produced. In re Thorpe, 227 USPQ 964, 966 (Fed. Cir. 1985). If applicant still believes distinct structure(s) is/are indeed produced in the instant invention, then applicant is encouraged to clearly and definitely recite or define the distinct structure(s) in the claims, as it has been held that: Although the claims are interpreted in light of the

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specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

### ***Conclusion***

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shouxiang Hu whose telephone number is 571-272-1654. The examiner can normally be reached on Monday through Thursday, 7:30 AM to 6:00 PM.

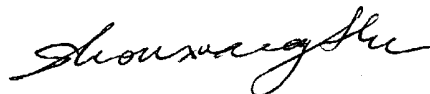


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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C. Lee can be reached on 571-272-1732. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SH  
April 20, 2004



**SHOUXIANG HU**  
**PRIMARY EXAMINER**